COMP 182 Algorithmic Thinking

Spring 2021

Syllabus

Course Objectives and Learning Outcomes

The objective of the course is to introduce Algorithmic Thinking as a way of problem solving. To achieve this, the course teaches discrete mathematics and algorithms in the context of real-world applications. The goal is for students to learn the foundations on which most of computer science is built and to understand the interplay between mathematics, algorithms, and programming.

Required Texts and Materials

The textbook is "Discrete Mathematics and Its Applications" (7th Edition) by K. Rosen. McGraw-Hill. Yes, there is now an 8th Edition, and it's fine to have that. However, everywhere I mention chapter or section numbers, I am referring by default to the 7th Edition.

The topics we will cover (chapter numbers correspond to the aforementioned textbook), but not in this specific:

- Chapter 1: The foundations: Logic and proofs
- Chapter 2: Basic structures: Sets, functions, sequences, sums, and matrices
- Chapter 3: Algorithms, divide-and-conquer, complexity of algorithms and asymptotics
- Chapter 5: Induction and recursion
- Chapter 6: Counting
- Chapter 7: Discrete probability
- Chapter 8: Advanced counting techniques
- Chapter 9: Relations
- Chapter 10: Graphs and graph algorithms
- Chapter 11: Trees
- [Not in Textbook] Greedy algorithms
- [Not in Textbook] Dynamic programming
- [Not in Textbook] Markov chains and hidden Markov models

Class Meetings and Attendance

- **The class will meet T/Th synchronously, and every student must attend both sessions** (students will be graded for attendance).
- **The class will not meet on Fridays.**
- Lecture videos will be made available before class and students need to watch these videos before the class meetings.
    - In addition to the videos, we will provide *basic* quizzes. These quizzes will not be graded. They are provided so that students test their *basic* knowledge of the materials. The emphasis here is on "basic" in the following sense.
    - *If you struggle with the quizzes*, that's a sign that you need to take action immediately to remedy the situation. This action includes options like re-watching the videos, doing reading in the textbook, going to office hours, etc. If you don't take action, you'll most likely be lost during the Tuesday/Thursday class meetings, and on the homework assignments and exams.
    - *If you "ace" the quizzes*, that does *not* mean you've mastered the material; it means you understand the basics and it's time for you to move on to work on the problem sets that we will provide during the Tuesday/Thursday classes and the homework assignments.
- The T/Th class meetings will be used to work on problem sets.
    - It is expected that you have watched the relevant videos before these classes and understood the materials covered.
    - If you have questions about materials covered in the videos, please make sure you get these questions answered. There are many ways to accomplish this, including: ask questions about the materials during the T/Th class meetings, post questions on Piazza, or go to office hours.

Exams and Papers

There are two scheduled exams:

- A midterm: Monday, March 15th (time TBD).
    - The midterm will cover all materials covered in the first six weeks: Logic and proofs; Sets, functions, and relations; Sequences, summations, and matrices; Algorithm efficiency; and, Graphs.
- A final exam: Scheduled by the registrar's office (3 hours)
    - The final will be comprehensive, but focus will be mostly on the materials covered in Week 7 (Greedy algorithms) thereafter.

There is a set of ~10 homework assignments.

Grade Policies

- Midterm: 30%
- Final: 30%
- Homework assignments: 35%
- Attendance: 5%

Assignment of letter grades will be **no stricter than** the following:

- A: final grade ≥90
- B: 80 ≤ final grade < 90
- C: 70 ≤ final grade < 80
- D: 55 ≤ final grade < 70
- F: final grade < 55

Absence Policies

As stated above, attendance will be taken on Tuesdays and Thursdays. It is the student's responsibility to inform the instructor, **ahead of time if possible**, about absences.

Accommodations

These are still challenging times for many people, including students and faculty. We will be as accommodating as possible whenever the circumstances warrant that. However, we do hope students recognize that in such a large class (with close to 250 students), making individual accommodations can easily turn into a logistical nightmare. Therefore, we do ask that students seek accommodations only when absolutely necessary (i.e., please do **not** use this policy as a cover for mistakes you make with respect to due dates, etc.) and in a timely fashion (e.g., please do **not** talk to us in Week 11 about an issue that required accommodation during Week 3).

Rice Honor Code

In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at http://honor.rice.edu/honor-system-handbook/. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

Additional policies that are specific to COMP 182 include, but are not limited to:

- While collaboration is allowed, all submitted work (homework and exams) must be your own and written in your own words.
- You may **not** search for solutions to homework questions.

- You may **not** access solutions to homework assignments, no matter what the source is (you must not obtain solutions from students who took the course in previous semesters, search for them online, etc.).
- You may **not** post your solutions in the public domain (e.g., if you choose to store your work on sites such as github, you must do so by creating a private, password-protected account, and storing your work in it).
- You may **not** give access to your own solutions to other students.
- You may **not** use online forums (except for the comp 182 forum) to ask questions about homework material or ask for help.

Disability Support Services

If you have a documented disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Disability Support Services (Allen Center, Room 111 / adarice@rice.edu / x5841) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Syllabus Change Policy

This syllabus is only a guide for the course and is subject to change with advanced notice.